

Engineering the Digital Ecosystem

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GLOBAL PRODUCT DATA INTEROPERABILITY SUMMIT 2023



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Biography

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Cory Kinsel
Principal Engineer Systems Architect
Northrop Grumman

- Member of Enterprise Architecture Team
- Coached Engineers in MBSE Methodology and Tools
- 7+ years of Modeling and Simulation Experience
- B.S. AAE from Purdue University

What problem are we trying to solve

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- Engineering Ecosystem is full of tools and data that needs to be exchanged as part of normal business practices.
 - Ex: System Engineering sends requirements to Mechanical and Electrical
- The quantity of tools should be minimized, reducing costs
- These processes and exchanges need to be automated, where possible, to facilitate consistent exchanges.
- The environment needs to be specified to be the infrastructure to meet the requirements of the business processes and exchanges

- Tools are the foundation of any ecosystem and are the “bottoms up” starting point
- Consider:
 - Naming Conventions
 - Bundles (Packages)
 - Versioning of Tools
 - Compatibility of Tools
 - Clients, Plug-ins, and Server Applications
 - Network Deployment
 - Licensing



Tool Interfaces

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- How do tools integrate/interact?
- Things to consider regarding tool interfaces:
 - Integration Platforms (Business Insights)
 - API Availability
 - Web-Based
 - Data Export and Transformation
 - Plug-In Integrations or Tools



Abstracting the Tools

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- Capabilities can be met by a variety of tools
- Need to show like-for-like tools
 - Ex: 3D-CAD Software
- Tool Kinds can help define capabilities
- Consider:
 - Industry-known competitors and terminology



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Tool Features and Capabilities

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- Tools need to be understood by what they **can** do.
- Decisions need to be made on what tools **should** do
- Common capabilities can be tied to Tool Kinds
- Distinguishing features can be tied to individual tools

The logo for CAMEO SYSTEMS MODELER. It features a stylized 'C' icon containing a globe, followed by the word 'CAMEO' in a serif font, and 'SYSTEMS MODELER' in a smaller serif font below it, with a trademark symbol.



- The engineering environment needs to meet the business needs
- Processes should be tool-agnostic and standards-based
 - We can use tool kinds as a vehicle to achieve this goal
- Processes can include:
 - Development
 - Manufacturing
 - Data Exchanges between disciplines
 - Decision making trees
- Processes can be further refined to include “clickology” or work instructions as tools get selected

What not to do...

Pitfall: Being non-descriptive in terminology

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- Using generic or broad names leads to confusion for tools with multiple variants or architectures
 - You can use the “generic” name to help organize
 - Multiple usages (instances) of tools/databases probably exist
 - The usage names should align to internal/company server names

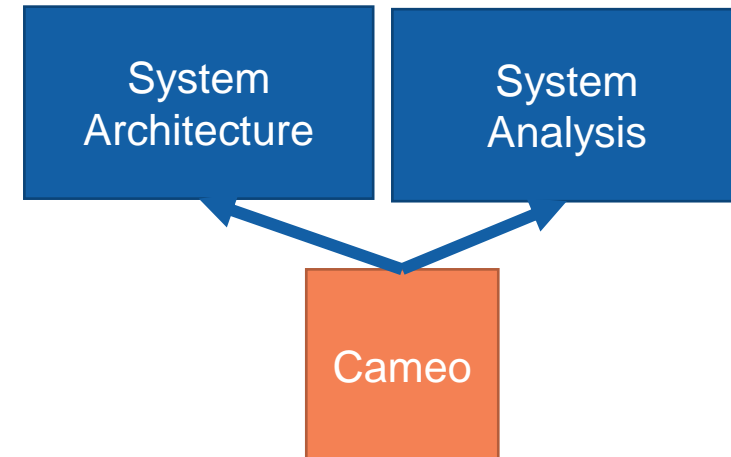
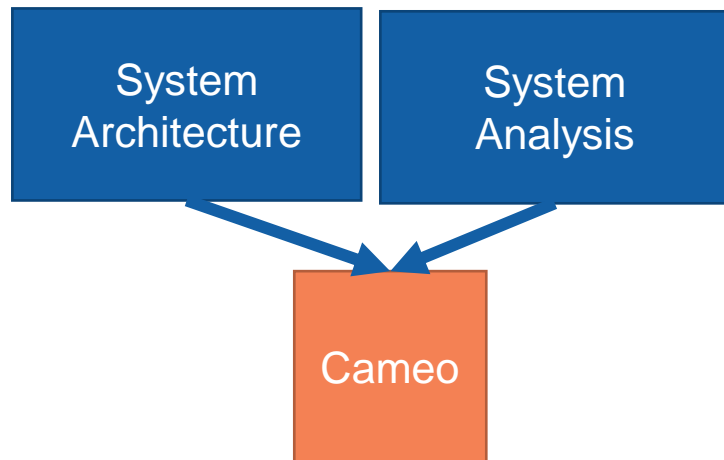


Pitfall: Selecting inappropriate relationships

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Relationships help tell the story

- Part-Whole (is comprised of)
- Used to show parts
- Can be overused via “decomposition”
- Generalization (is a)
- Used to show inheritance and specializations
- Careful to include parts and definitions



Pitfall: Engineering the Realization

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- Starting with the tools can lead to misguided engineering if there are no top-down requirements
 - Focus is on today, not what tomorrow brings
 - Abstracting the current architecture may miss key requirements
- Objective should be on performing the systems engineering
 - This requires a top-down meets bottom-up approach
 - Need to assess capability coverage and if gaps exist

Tips for Success

- Start with what decisions need to be made from the architecture
- Determine what data needs to be captured to facilitate those decisions
 - This may lead into a logical data model to help structure and plan constructs
- Make data capture convenient and easy for end users

- Use supertypes and constructs to enable...

Consistency

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- Stick to your modeling approach
- It's more important to pick a relationship than which one
- Minimize customizations and stereotypes
 - Pre-configured views enable consistent model constructs
 - Allow users to focus on data capture and decision making rather than how to model “correctly”
- Enable exporting of reports and views

What are your thoughts?